

5.4: Differentiation of Exponential Functions

Rule 1: Derivative of the Exponential Function

$$\frac{d}{dx}[e^x] = e^x$$

Example. Find the derivative of the following functions

$$f(x) = x^2 e^x$$

$$g(t) = (e^t + 2)^{3/2}$$

Rule 2: The Chain Rule for Exponential Functions

If $f(x)$ is a differentiable function, then

$$\frac{d}{dx} \left[e^{f(x)} \right] = e^{f(x)} f'(x)$$

Example. Find the derivative of the following functions

$$f(x) = e^{2x}$$

$$y = e^{-3x}$$

$$g(t) = e^{2t^2+t}$$

$$y = xe^{-2x}$$

Example. Find the inflection points of the function $f(x) = e^{-x^2}$.